Ionuț Adrian Rotaru

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WORK EXPERIENCE

01/06/2022 – CURRENT – Măgurele, Romania

SCIENTIFIC RESEARCHER – EXTREME LIGHT INFRASTRUCTURE - NUCLEAR PHYSICS CENTER (ELI-NP)

R&D for ion manipulation systems - Radio-Frequency Carpets and ion Milli-Tracks; The ELI Time Projection Chamber (ELITPC); The Extreme Light Infrastructure Silicon Strip Array (ELISSA)

10/2019 – 01/06/2022 – Măgurele, Romania

DOCTORAL RESEARCH ASSISTANT – EXTREME LIGHT INFRASTRUCTURE - NUCLEAR PHYSICS CENTER (ELI-NP)

Main activities involve development of experimental systems applied to nuclear physics, using ion optics simulations in SimIon 8.1, mechanical design using Catia 5.1, design of vacuum systems using Molflow and design of electronics.
My main responsibility is towards development of an Ion Guide Isotope Separation On-Line Cryogenic Stopping Cell (ELISOL) for photo-fission reactions, using high intensity gamma beams, at ELI-NP. For this project, I was responsible for the mechanical design of the Cryogenic Stopping Cell vacuum chambers and the electronics associated with the workings of ion capture and transport (design of internal electrodes, design of Radio-Frequency Carpets, the hardware implementation for powering the system). I was responsible with developing RF Carpets in-house and testing them, using a custom-build RF Carpet testing unit.

05/2018 – 09/2018 – Darmstadt, Germany

LAB ASSISTANT – GSI HELMHOLTZ CENTRE FOR HEAVY ION RESEARCH

My main responsibility was the conceptual, mechanical and electrical design of an experimental system called INCREASE (In-Cell Reaction System), that was installed inside the Cryogenic Stopping Cell located at the FRS-IC facility and facilitated the first Multi Nucleon Transfer reactions study at this institute. I also designed the mechanical execution booklet of this system and supervised the assembly in Giessen, Germany.

12/2013 – 11/2019 – Măgurele, Romania

NUCLEAR PHYSICIST – HORIA HULUBEI NATIONAL INSTITUTE FOR R&D IN PHYSICS AND NUCLEAR ENGINEERING (IFIN-HH)

Main activities involve technological developments for the Department of Tandem Accelerators. This involved various upgrades for the 3 MV Tandetron Accelerator (an experimental set-up that works inside a vacuum chamber and facilitates Ion Beam Analysis studies on liquids and an experimental set-up that allows the accelerated ion beam to be extracted in-air and analyze objects that are cultural significant or biological samples), upgrades to the 1 MV Tandetron Accelerator (installing various sensors on the accelerator to bring important readings to the command room) and upgrades to the 9MV Tandem Accelerator (replacing digital signal cables with fiber wire for the vacuum components and automation of the vacuum system at the control panel using LabView). Another important activity was the ion optical, mechanical, vacuum and electrical design of the SUDEL project, a 9.75 kW electron beam welder. I was responsible for the conceptual design of this machine, including the design and construction of ion optical components of the acceleration structure (magnetic focusing coils and deflectors).

EDUCATION AND TRAINING

2014 – 2020 – Bucharest, Romania

PH.D. IN NUCLEAR PHYSICS – Politehnical University of Bucharest, Faculty of Applied Sciences

Field(s) of study

- Mathematics and Physics

Thesis: Development of techniques for ion-beam analysis and ion manipulation

EQF level 8

2012 – 2015 – Măgurele, Romania

M.S. IN NUCLEAR PHYSICS – University of Bucharest, Faculty of Physics

Field(s) of study

- Atomic and Nuclear Physics, Elementary Particles, Astrophysics and Applications

Thesis: Design of an electron beam welder

EQF level 7

2008 – 2013 – Măgurele, Romania

B.S. IN APPLIED SCIENCES – University of Bucharest, Faculty of Physics

Field(s) of study

- Applied engineering sciences - Technological Physics

Thesis: Study of piezoelectric materials

EQF level 6

12/2016 – 03/2017 – Archamps, France

GRADUATE CERTIFICATE – European Scientific Institute

Field(s) of study

- Joint Universities Accelerator School

LANGUAGE SKILLS

Mother tongue(s): **ROMANIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	C1	C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

My Digital Skills

MOLFLOW | SIMION | LabView | SRIM | MultiSim | Lua programming language | Catia V5

HONOURS AND AWARDS

03/2021

First prize at the ELI-NP Young Scientists Competition – Extreme Light Infrastructure - Nuclear Physics Center (ELI-NP)

First prize awarded for presenting my work, titled "INCREASE, An IN-Cell REAction SystEm for multi-nucleon transfer and spontaneous fission experiments"

https://indico.eli-np.ro/event/126/attachments/245/384/2021-03-31_De_la_minus_la_plus_infinit-Zilele_tinerilor_cercetatori_ELI-NP.mp3

12/2018

First prize at Young Researchers Days, IFIN-HH – Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH)

First prize awarded for presenting my work, titled "RF carpet design and testing for cryogenic stopping cells"

2018

First prize at the UB Talks competition – University of Bucharest

First prize for the presentation given in the field of "Cancer treatment in Romania using hadrontherapy"

2017

First prize at the UB Talks competition – University of Bucharest

First prize for the presentation given in the field of "Nuclear Forensics"

2018

Award for best poster at EURORIB 2018 – EURORIB2018

Best poster award and invited to give a presentation at the EURORIB2018 conference

PUBLICATIONS

Simulation of circular radio-frequency carpets for ion extraction from cryogenic stopping cells

UPB Sci. Bull. A 81 (2019) 197
https://www.scientificbulletin.upb.ro/rev_docs_arhiva/fullb1d_485554.pdf – 2019
At ELI-NP, isotopes of refractory elements and heavy rare earth elements will be investigated by using the ion guide isotope separation on-line technique (IGISOL). A two-chamber cryogenic stopping cell with orthogonal extraction will be used together with RF carpets for the production and extraction of radioactive ions. In the present work, the extraction time of photo-fission fragments is investigated, from the first chamber of the cryogenic stopping cell by implementing RF carpets and gas collision models in the SimIon 8.1 simulation software.

Ion beam optic simulations at the 1 MV Tandetrontm from IFIN-HH Bucharest

Rom. Rep. Phys. 71 (2019) 204
http://www.rrp.infim.ro/2019/AN71204.pdf – 2019
The RO-AMS facility was commissioned in 2012 and it has been dedicated to the analysis of several radionuclides, such as: 10Be, 14C, 26Al and 129I. A significant improvement in the operation and setup change of this machine is done by developing an analytical tool for beam diagnostics by using the SIMION®

simulation code. Precise ion beam traceability conveys to higher detection sensitivity that is critical in the accelerator mass spectrometry applications. Furthermore, these simulations allow the analysis of various modifications in the ion beam optics of the accelerator by adding, removing or replacing components or changing their relative positions.

Development of an external ion beam setup at the 3 MV Tandetron accelerator at IFIN-HH

Rom. Rep. Phys. (2021)
http://www.rrp.infim.ro/IP/AP603.pdf – 2021
We describe our progress in designing an experimental system to enable in-air Ion Beam Analysis (IBA) at the 3MV Tandetron accelerator at IFIN-HH. The main applications will be investigations of objects of cultural heritage using external ion beams and analysis of materials that are not compatible with high vacuum. We discuss the technical solution and its implementation, together with the experimental results that demonstrates this new setup.

INCREASE: An in-cell reaction system for multi-nucleon transfer and spontaneous fission at the FRS Ion Catcher

Nucl. Inst. Meth. B 512 (2022) 83
https://www.sciencedirect.com/science/article/pii/S0168583X21003943 – 2021
A complex, long-range experimental program for the production of neutron-rich nuclei via multi-nucleon transfer (MNT) reactions and spontaneous fission (SF) inside the Cryogenic Stopping Cell (CSC) of the FRS Ion Catcher facility at GSI has been suggested and is under development. A key component is a new experimental set-up, consisting of a modified DC cage, a target-wheel, a beam-dump and a space charge suppression system. This setup replaces the standard electrode structure of the CSC, enabling generation of radioactive isotope beams by in-cell MNT reactions inside the CSC and the efficient and fast extraction of ions produced by MNT reactions or spontaneous fission. Furthermore, the system allows to do experiments with beams from the FRS with much higher rates and shorter half-lives. We present the specifications, design and production of this device. We also present the technical solution adopted against the space charge effect and the simulations that validate it.

Spiral RF carpet for ion mass spectrometry with radioactive isotope beams

Int. J. Mass spectrom. 478 (2022) 116858
https://www.sciencedirect.com/science/article/pii/S138738062200063X – 2022
A new type of Radio-Frequency carpet for ion trapping and transport, which is made of a small number of long electrodes wrapped together as parallel spirals, starting from the central ion extraction aperture, and extending outwards, is introduced as an alternative to the currently used concentric geometry. The main features introduced are the possibility to construct high electrode densities RF carpets which enhances the characteristics of such devices, by improving the collection efficiency, and a simpler design that eliminates the complex electronic layer from the carpet. The feasibility of the proposed novel spiral geometry for RF carpets is investigated using ion optics simulations.

DRIVING LICENCE

Driving Licence: B